

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WATER AND SEDIMENT CONTROL BASIN

(No.)

CODE 638

DEFINITION

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

PURPOSES

A water and sediment control basin may be established to:

- Improve farmability of sloping land
- Reduce watercourse and gully erosion
- Trap sediment
- Reduce and manage onsite and downstream runoff
- Improve downstream water quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse or gully erosion is a problem.
3. Sheet and rill erosion is controlled by other conservation practices.
4. Runoff and sediment damage land and improvements **or impair water quality**.
5. Soil and site conditions are suitable.
6. Adequate outlets can be provided.

7. Failure of the embankment shall not result in loss of life or damage to roads, utilities, buildings or other improvements.

**NRCS, NHCP
May, 2002**

Water and sediment control basins shall not be used in place of terraces. Where a ridge and/or channel extend beyond the detention basin or level embankment, standards for Terrace (600) or Diversion (362) must be applied as appropriate.

CRITERIA

General Criteria Applicable To All Purposes

The resource management system must reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operation problems.

Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a water and sediment control basin may be used to separate this area from, and permit treatment of the lower slope.

The design must limit inundation, infiltration, and seepage to prevent crop damage and/or other problems.

When soil infiltration outlets are used, infiltration may absorb most of the runoff. Deep percolation and ground water recharge may occur when conditions permit. Where snow is available, it is often tapped in channels and catchments, improving infiltration possibilities.

This practice traps and removes sediment and sediment attached substances from runoff. Trap efficiencies may exceed 90% 90% in silt loam soils. Where geologic conditions permit, the practice will lead to increased loadings of dissolved substances toward ground water. Water temperatures of surface runoff, released

**NRCS, WV
September, 2007**

through underground outlets, may increase slightly because of the longer exposure to warming during it's impoundment.

Laws and Regulations. This practice must conform to all federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Federal, State and Local

Design and construction activities shall comply with all federal, state, and local laws, rules, and regulations governing activities in or along streams, pollution abatement, health, and safety.

The owner or operator shall be responsible for securing all required permits or approvals and for performing all planned work in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring these permits, rights, or approvals, or for enforcing laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights or approvals to construct, operate, and maintain the practice.

Permits may be required from the following agencies when obstruction removal is performed within the boundaries of a stream or floodplain or if burning is required:

- 1. U.S. Army Corps of Engineers***
- 2. WV Department of Natural Resources***
- 3. WV Public Lands Corporation***
- 4. US Fish and Wildlife Service***
- 5. Local state and county ordinances***

Work near waters where there is a present or possible presence of endangered or threatened species require notification and collaboration with the USFWS prior to implementation.

Work in or adjacent to "Waters of the US" may require a WV Public Land Corporation Application, a Nation Wide Permit or

appropriate Individual Section 404 permit from the USCOE prior to implementation of the project. All required permits will be approved prior to construction implementation.

Spacing. Water and sediment control basins must generally be spaced at terrace intervals (see standard for Terrace (600)). Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins.

The system of basins and row arrangements must be parallel and spaced to accommodate farm machinery where needed to fit row crop spacing.

Spacing design must consider embankment slope lengths, top width, and outlet location.

Cross section. For portions of the basin controlling only flowing water 3 feet or less deep, embankment slopes must be two horizontal to one vertical, or flatter. For all other portions of the basin, the sum of the upstream and downstream slopes must be 5:1 or flatter with a maximum of 2:1 in either slope. Slopes may be vegetated or flattened to permit cropping.

Earth Embankment. Minimum effective top widths are given in Table 1. Constructed embankment height must be at least 5% greater than design height to allow for settlement. The maximum settled height of the embankment must be 15 feet or less measured from natural ground at centerline of the embankment.

Table 1. Minimum Top Width of Embankments

Fill Height (feet)	Effective Top Width (feet)
0 – 5	3
5 - 10	6
10 –15	8

Storage Capacity

The total storage capacity, measured to the maximum settled fill elevation, for all basins (series or individual) are within the following limits on Table 2:

**Table 2: Water -Sediment Control Basins
Storage limits**

* Greatest height for any basin in series, measured from the low point in the natural ground along the downstream toe to the settled embankment elevation.

Max. Embankment Height (ft)*	Max. Accumulated Storage (all basins)	Max. Storage (single basin)
Less or equal to 6	50 acre-ft	3 acre-ft
6 ft to 15 ft.	15 acre-ft	3 acre-ft

Foundation cutoff and seepage control.

Portions of basin ridges designed to impound more than a 3-foot depth of water must include foundation cutoff and seepage control as required by the standard for Pond (378).

Capacity. Basins must have capacity to prevent overtopping by runoff from a 10-year frequency, 24-hour duration storm. Larger design storms may be used where needed for flood control or other purposes.

In addition to the above storage, basins must have capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal must be provided to maintain the required capacity.

The Procedures contained in the Erosion and Sediment Control Handbook for Developing Areas West Virginia will be used to determine sediment yield from disturbed areas.

When the contributing drainage area to the basin consists of 10 ac. or more of undisturbed land, procedures contained in NEH-3, Chapter 8 will be used to determine sediment yield from the undisturbed area. Total sediment volume will be the sum of the yield from both disturbed and undisturbed areas.

Basin ends must be closed to an elevation that will contain design capacity. Freeboard may be added to design height to provide for safe operation of auxiliary spillways. Auxiliary

spillways must not contribute runoff to a lower basin (or pond) except where the lower basin (or pond) is designed to control the flow.

Overflow Protection for Multiple Basins

Additional protection of the embankment may be provided by installation of auxiliary spillways, by flattening the downstream slope of the embankment or by raising the fill elevation within the maximum 15 feet total settled height limit.

Auxiliary spillways may be either excavated or pipe spillways. The design capacity and size shall be based desired level of protection.

Excavated spillways may be parabolic, V-shaped or trapezoidal in cross section. They will have a 2% or steeper inlet section followed by a 10 foot long (minimum) level section. Side slopes will be no steeper than 2:1 SS. As a minimum the exit channel slopes will be no steeper than 5% where the ground is to cultivated or 10% when maintained in vegetation, refer to CPS 378-Pond for additional auxiliary spillway criteria.

Auxiliary spillway shall not contribute runoff to a lower basin in series that does not have an auxiliary spillway.

Outlets. Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to standards for Pond (378), Grassed Waterway (412), Diversion (362) or Underground Outlet (620) as appropriate.

Outlets will be designed to drain the design runoff storage volume within 48 hours, or more rapid if needed to prevent damage to crops.

Inlets will be standpipes which will allow for accumulation of sediment without affecting the function of the inlet. Provisions should be made to accommodate increased storage at a later date.

Topsoil. Where necessary to restore or maintain productivity, topsoil must be stockpiled and spread over disturbed areas.

Vegetation. Disturbed areas that are not cropped must be established to appropriate

vegetation or otherwise protected from erosion using organic or gravel mulch or other measures.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with standards for Critical Area Planting (342) and Mulching (484).

Fencing, guardrails and signs and other safety measures shall be installed as necessary to protect the public. Fencing shall meet the CPS 472- Livestock Exclusion or 382- Fencing.

CONSIDERATIONS

Water and sediment control basins should be part of a resource management plan including such practices as terraces, grassed waterways, contouring, a conservation cropping system, conservation tillage, and crop residue management.

Where possible, the basin should be configured to enhance sediment deposition. This can be accomplished by using flow deflectors, inlet and outlet selection, and by adjusting the length to width ratio.

For cropped fields, embankment orientation and crop row direction should be approximately perpendicular to the land slope to support contour farming. The design should support farmability by limiting short point rows or sharp curves. Field boundaries and row lengths should also be considered in planning basin location and row direction.

Effects on streams and wetlands must be considered. Mitigation may be required where water is diverted or degraded for downstream uses.

This practice can be used to develop/enhance seasonally ponded areas for migratory waterfowl.

Where possible, the design should enhance habitat for native and endangered species. Effects on downstream water quality and temperature may be critical for some species.

This practice may adversely affect cultural resources. Planning, installation and

maintenance must comply with GM 420, Part 401.

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment and water control basins must conform to requirements of this standard and must describe requirements for applying the practice and achieving its intended purpose.

The sediment cleanout disposal area shall be located or outlined on the engineering and/or construction plans and disposed of in a non-wetland, prior site.

Plans prepared in conformance with NRCS conservation practice standards shall be developed in accordance with those standards.

OPERATION AND MAINTENANCE

A site specific O&M plan must be prepared for and reviewed with the landowner or operator. The plan shall contain guidance to maintain the embankment, design capacity, vegetative cover and outlet.

All plans shall include a provision that after each large storm, basins must be inspected and needed maintenance performed. When sediment storage is full, accumulated sediment must be removed or the basin must be redesigned and modified to restore capacity.

Where designs include underground outlets, O&M plans should include checking for clogging and/or pipe damage.

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OPERATION AND MAINTENANCE PLAN

- *Sediment shall be periodically removed from the basin to maintain it's capacity. If full, remove material immediately. Spread sediment material in other areas where it will not enter the stream.*
- *All disturbed land shall be re-vegetated according to the CPS 342-Critical Area Planting. The area will be immediately fertilized, limed, seeded and mulched.*
- *Provide frequent inspections and remove material as needed.*
- *Inspect structures, embankments and outlets after every major storm.*
- *Maintain and repair damage to embankments, spillways, outlets and vegetation or fencing immediately.*
- *Verify the elevation of the structure before and after sediment removal, when a large amount of material has been removed.*
- *Properly dispose of materials in an upland area or as designated on the engineering plans.*
- *Maintain vegetation by liming, seeding, fertilizing and mowing to prevent growth of trees or other woody cover according to typical agronomic practices.*
- *When infiltration outlets are used, occasional disk or plow the pool area to break up soil compaction and increase aeration.*
- *Other*